NON-PUBLIC?: N
ACCESSION #: 8812080047
LICENSEE EVENT REPORT (LER)

FACILITY NAME: HOPE CREEK GENERATING STATION PAGE: 1 OF 4

DOCKET NUMBER: 05000354

TITLE: UNANTICIPATED TURBINE-GENERATOR (T-G) TRIP AND REACTOR SCRAM CAUSED BY
FAILURE OF EXCITER BRUSH - EQUIPMENT FAILURE
EVENT DATE: 11/01/88 LER #: 88-029-00 REPORT DATE: 12/01/88

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: A. Merrell - Lead Engineer - Technical TELEPHONE: (609) 339-5239

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: TL COMPONENT: GEN MANUFACTURER: G084
B AB PDT R369
REPORTABLE TO NPRDS: N
Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On November 1, 1988 at 1048 hours, the Plant was in OPERATIONAL CONDITION 1 (Power Operation) at 100% power generating 1086 MWe when a main generator lockout occurred followed by fast closure of the turbine control valves, main turbine trip and reactor scram. The "A" and "B" recirculation pumps tripped as expected on an end-of-cycle recirculation pump trip logic signal. Reactor pressure increased and the "H" safety/relief valve (SRV) lifted. The "A", "B" and "C" reactor feedwater pumps (RFP) tripped on a level 8 (+54") signal. High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) initiated on a level 2 (-38") signal and injected for approximately ten (10) minutes. The "C" RFP was restarted to maintain reactor water level and HPCI and RCIC were removed from service. All reactor protection system isolations occurred as expected, however the "P" SRV failed to lift due to a faulty Rosemount pressure transmitter. The loss of main generator excitation was caused by the failure of the exciter brush- collector ring assembly. The root

cause of this failure could not be determined because of the extreme damage to the failed exciter brushes. Corrective actions include replacement of the exciter brushes, the development of a new procedure to replace the existing weekly brush inspection and the addition of channel checks of the Rosemount pressure transmitters associated with the low-low set SRVs to provide earlier detection of transmitter failures.

END OF ABSTRACT

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)
Main Generator Exciter (EIIS Designator:TL)

IDENTIFICATION OF OCCURRENCE

Unanticipated Turbine-Generator (T-G) Trip and Reactor Scram Caused By Failure of Exciter Brush - Equipment Failure

Event Date: November 1, 1988
Event Time 1048 Hours

This LER was initiated by Incident Report No. 88-153

CONDITIONS PRIOR TO OCCURRENCE

The Plant was in OPERATIONAL CONDITION 1 (Power Operation) at 100% power generating 1086 MWe.

DESCRIPTION OF OCCURRENCE

On November 1, 1988 at 1048 hours, a main generator lockout occurred followed by fast closure of the turbine control valves, main turbine trip and reactor scram. The "A" and "B" recirculation pumps tripped as expected on an end-of-cycle recirculation pump trip logic signal. Reactor pressure increased and the "H" safety/relief valve (SRV) lifted. The "A", "B" and "C" reactor feedwater pumps (RFP) tripped on a level 8 (+54") signal. High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) initiated on a level 2 (-38") signal and injected for approximately ten (10) minutes. The "C" RFP was restarted to maintain reactor water level and HPCI and RCIC were removed from service. All reactor protection system isolations occurred as expected, however the "P" SRV failed to lift due to a faulty Rosemount pressure transmitter.

APPARENT CAUSE OF OCCURRENCE

The cause of this occurrence was the loss of main generator excitation which was caused by the failure of the exciter brush-collector ring assembly. The root cause of this failure could not be determined because of the extreme damage to the failed exciter brushes.

ANALYSIS OF OCCURRENCE

Investigation of the exciter brush failure indicated that the poor brush-collector contact could have been caused by inadequate clearance between one or more brushes and their respective brush holders, causing the brushes to "hang-up" in the holders. This condition could have been aggravated by oil contamination from an existing Alterrex bearing oil leak near the collector rings. Damage was localized at the collector ring nearest the bearing. There was no evidence of other contributing factors such as field grounds or over-excitation. Field ground and resistance tests were satisfactory. Extreme brush wear is not suspected since brush wear is checked weekly by the maintenance department. No excessive wear was noted at the inspection just prior to this event. Another check of exciter condition is made daily by the operations department. An entry is made in the daily operations department log of any abnormality observed in exciter condition. No abnormalities were noted in the log for the day preceding this event. it is conceivable that a more rigorous inspection of the brushes could have detected the problem and prevented the failure, although brush fit is difficult to determine with the unit in operation.

The "P" SRV failed to lift at its design pressure of 1047 Psig. On investigation, it was determined that the failure was caused by a faulty Rosemount pressure transmitter, which was replaced. Since this failure might have been detected by a channel check, channel checks of all Rosemount pressure transmitters associated with the low-low set SRVs are being added to the surveillance logs.

PREVIOUS OCCURRENCES

There have been no other main generator exciter brush failures at Hope Creek; however arcing of exciter field brushes caused a loss of field excitation, turbine trip and scram at another BWR with a similar T-G. The root cause of that event was inadequate preventive maintenance, which was not the case at Hope Creek.

SAFETY ASSESSMENT

The plant safety systems actuated as designed. For this reason, the health and safety of the public were not compromised by this event.

REPORTABILITY

This report is being submitted pursuant to the requirements of 10CFR50.73 (a) (2) (iv).

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CORRECTIVE ACTIONS

1. The exciter brushes were replaced and other repairs were made as necessary.

2. A new procedure to replace the existing weekly brush inspection is under development. It will provide detailed guidelines for weekly brush inspections and detailed steps for brush replacement. This new procedure will be applicable to the recirculation pump motor-generator sets as well as the main generator brushes.

3. As described above, channel checks of all Rosemount pressure transmitters associated with the low-low set SRVs are being added to the surveillance logs to provide earlier detection of transmitter failures.

Sincerely

J. J. Hagan
General Manager -
Hope Creek Operations

AM:

SORC Mtg. 88-161
CD-399F

ATTACHMENT 1 TO 8812080047 PAGE 1 OF 1

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Nuclear Department

December 1, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk

Washington, DC 20555

Dear Sir:

HOPE CREEK GENERATING STATION
DOCKET NO. 50-354
UNIT NO. 1
LICENSEE EVENT REPORT 88-029-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR50.73 (a) (2) (iv).

Sincerely,

J. J. Hagan
General Manager -
Hope Creek Operations

AM:

Attachment

SORC Mtg. 88-161
CD-399F

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